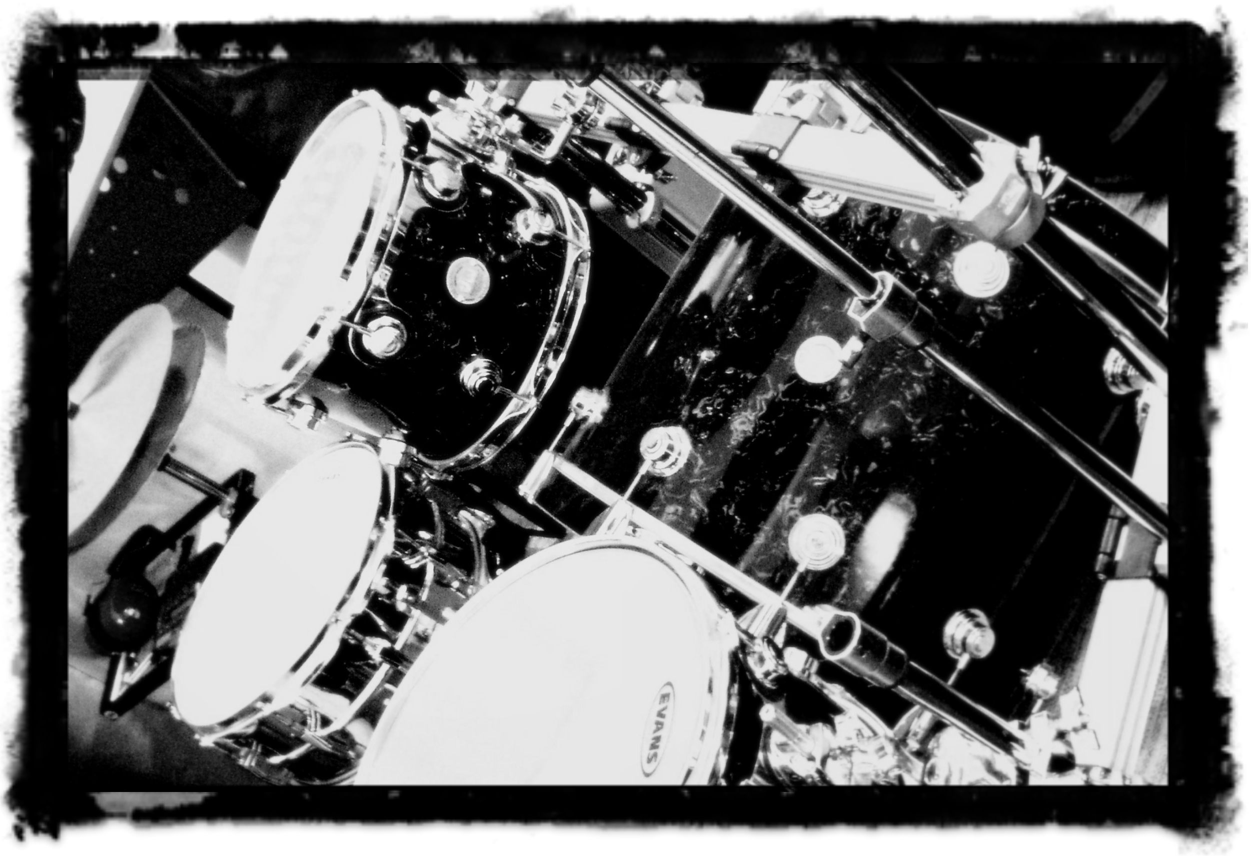
Drumset in Mathematics

An Invaluable Companion in Studies



by

Gianpaolo Gallian

To Mom and Dad

Drumset in Mathematics - An Invaluable Companion in Studies
by Gianpaolo Gallian

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Introduction

Hello, drummers, and welcome to this book!

Have you ever wondered about what to practice during your free, little practice time in your practice environment, and how to get the most out of it?

Well, this book is just about it: it will provide an easy step by step method to assist you in building your practice routine, whether you have a drumset at your disposal or just your hands and feet.

That's right: just your hands and feet!

Who told you that you need a drumset to practice the drums at home?

In reality, many drummers have little or no time to practice on their instruments, while on the road, touring, or just gigging around, and let me tell you: I've learned more from those times than from the many times I was sitting behind my drumset, comfortably, at home.

I've realized that it takes first a clear mind to practice music on any instrument, and besides that, the basic coordinations can be obtained no matter what you have at your disposal.

While having and instrument can affect your touch, sensitivity and musicality in a positive, driving way, it can also affect the physics of your body in a wrong way, leading you to think about adjusting your body to your instrument, as opposed to adjusting your instrument to your needs, and follow the natural way of your body.

So, you now have no excuses as to what to use as your gear. Let's get started!

How This Method Works

As a drummer, I've often gone through different methods from different teachers, each one exploring subjects from different standpoints, all musically valid.

However, no one of them showed me the real basics, that can be acquired no matter what method you decide to use: they are there all the time, waiting for someone to notice and practice them!

These basics are the following:

1. The Single Stroke
2. The Double Stroke (one stroke & one bounce)
3. The Triple Stroke (one stroke & two bounces)
4. The Quadruple Stroke (one stroke & three bounces)

Of course, Quintuple strokes and beyond can be involved every time you want to, but dare I say, 98% of contemporary drumming is from the above.

So, how do we go about it?

Very simple, since we have four limbs, we will start applying each stroke to every limb, in turn. Once we have done it, we will mix different kinds of strokes together, and apply the resulting combinations to all of the limbs in turn, again.

One final note: we will always be starting with the weakest limb (whether we are playing hands or feet), and then we will invert the limbs, so to make sure we develop the same facilities with both limbs (of course this will not happen when the limbs are playing together in unisons): this process is also known as "reversing the sticking".

With this in mind, let's move on...

Chapter 1:

The Four Basic Strokes - Practice

First, we will be playing the four basic strokes, starting with the single: we will play it with the weak hand first, then with the strong, then we will play both hands together in unisons (it means they will play the same notes at the same time, in sync), and finally we will interlace the strokes (it means that we will play every other note with the other hand, but each hand will still be individually playing single strokes, so that the 1st and 3rd note, or the 2nd and 4th, will be played with the same hand and be part of two different single strokes, or impulses). Then we will do the same thing with the feet: we will play the weak foot first, then the strong, then both feet together in unisons and then interlace the strokes.

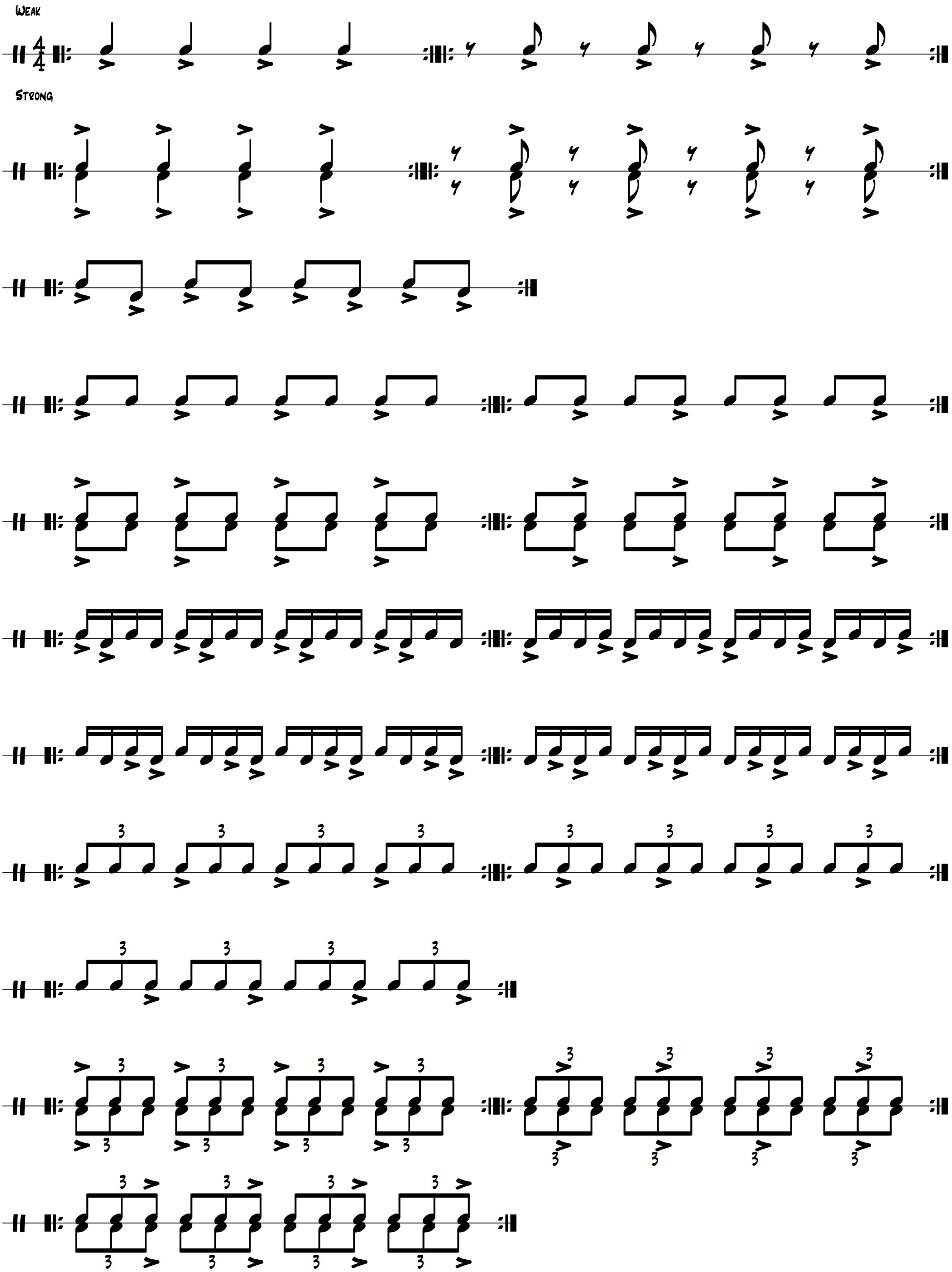
Then we will move to the double stroke, and follow the same procedure we followed for the single stroke: first the weak hand, then the strong, then together in unisons, then interlaced (it means that we will play every other note with the other hand, but each hand will still be individually playing double strokes, so that the 1st and 3rd note, or the 2nd and 4th, will be played with the same hand and be part of the same double stroke, or impulse). Then we will go for the feet and do the same thing.

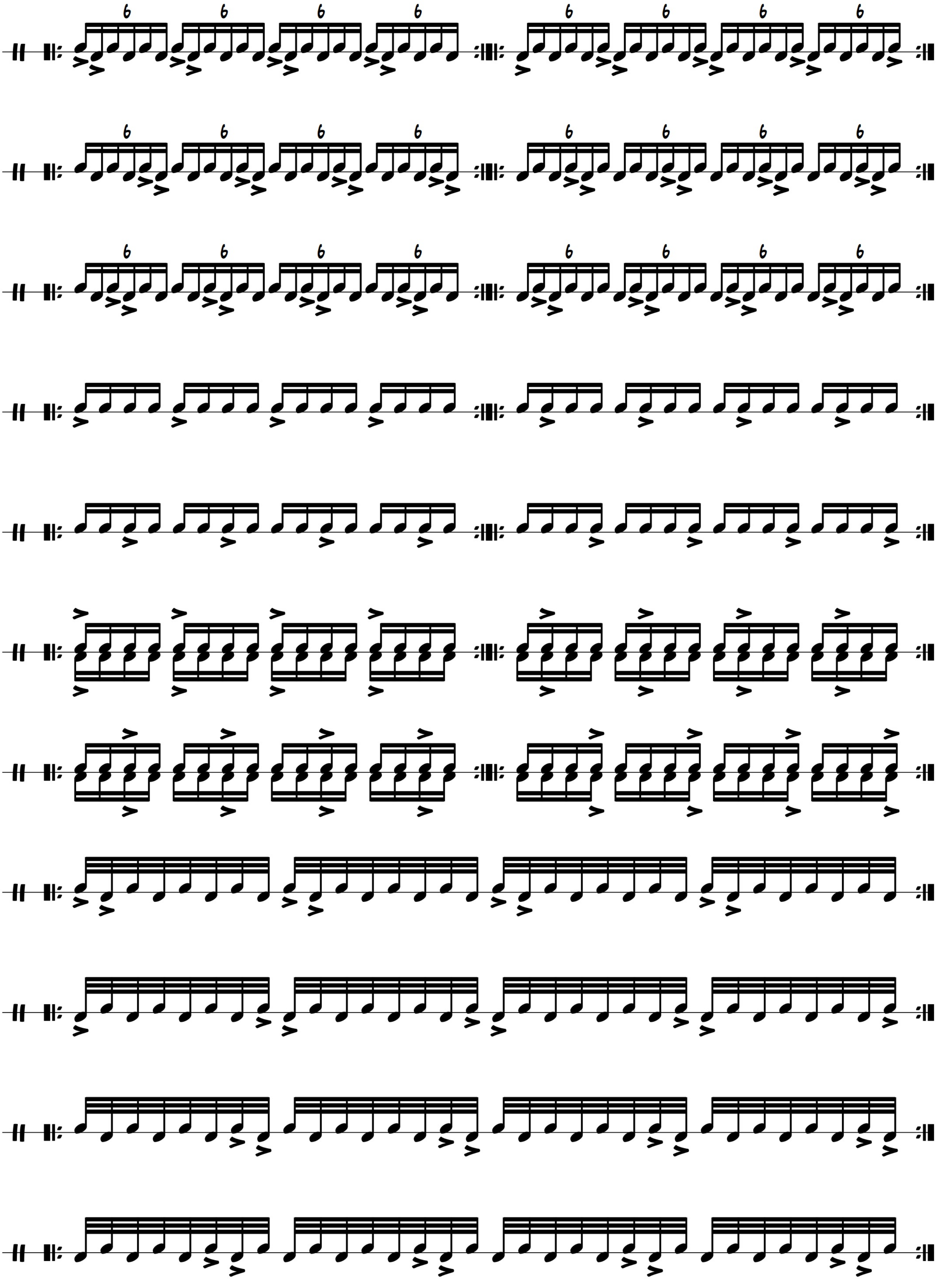
After that, we will move to the triple strokes, and follow the same procedure we followed for the previous strokes: first the weak hand, then the strong, then together in unisons, then interlaced (it means that we will play every other note with the other hand, but each hand will still be individually playing triple strokes, so that the 1st, 3rd and 5th note, or the 2nd, 4th and 6th, will be played with the same hand and be part of the same triple stroke, or impulse). Then we will go for the feet and do the same thing.

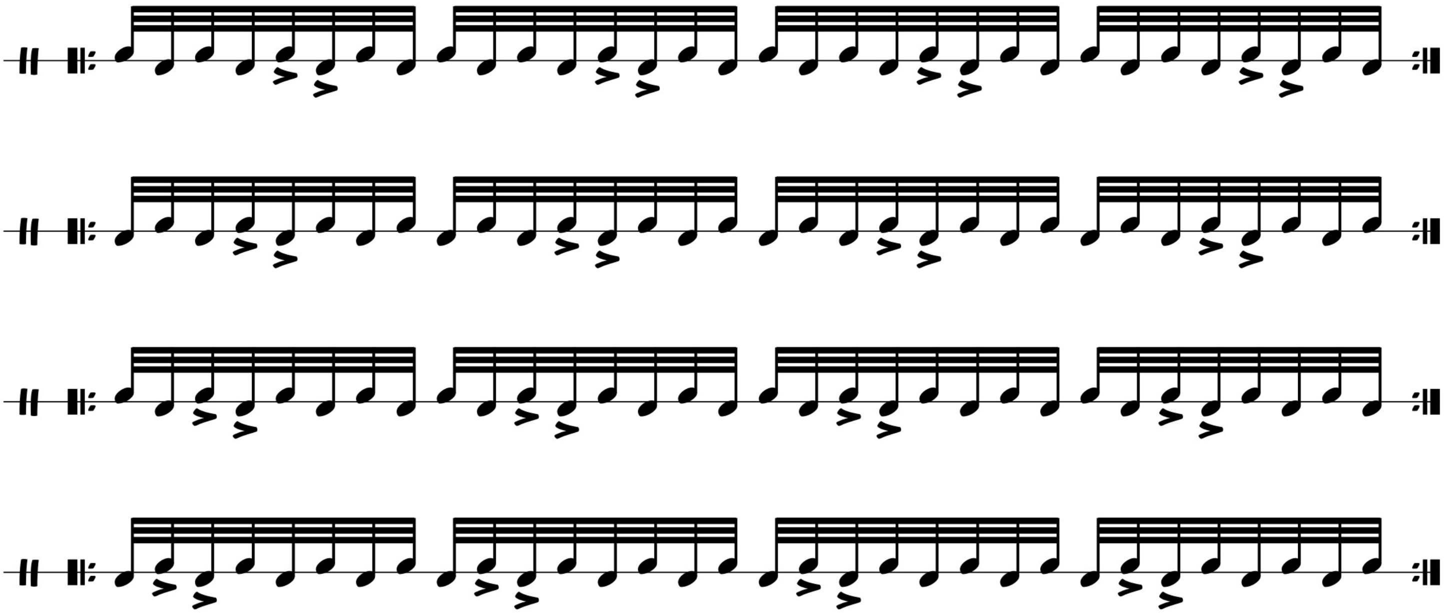
And finally, we will move to the quadruple strokes, and follow the same procedure we followed so far, for both hands and feet.

To make it simpler, examples written in western standard musical notation are reported below. Please note that accents are used just for the purpose of showing each initial impulse of the stroke, and do not mean to play any note louder, by all means: notes can, and should be played at the same dynamical level, also.

The Four Basic Strokes







As you can see, what we have done was to play each stroke starting the initial pulse on every available rhythmic subdivision of the measure (well, not really every one, because that would involve "foreign" subdivisions, too, but we will get to those soon...). Notice that when we play interlaced strokes the way they are written, each limb is playing the same previous basic stroke, they are just starting on different places of the measure. The idea here is to keep the motion going and be versatile starting it wherever. In the next chapter we are going to mix different kinds of strokes together, and allow for creativity and freedom of expression, introducing the concept of "check pattern".

Chapter 2:

The Combinations

So far, we exercised playing the strokes separately. Now it's time to put them together!

We will start by playing the first two strokes at the same speed, meaning that all the subdivisions in the measure will be the same, but the kinds of stroke used will be two.

This is also known as playing a "check pattern": check patterns are nothing more than doing the same thing (playing the same notes, at the same speed) in different ways. What will vary here will be the stickings, namely the chosen permutations to play the same exact rhythmic figure.

We will see how this will work, starting with the different ways to combine the single stroke with the others, and then combining the double and triple strokes with the remaining.

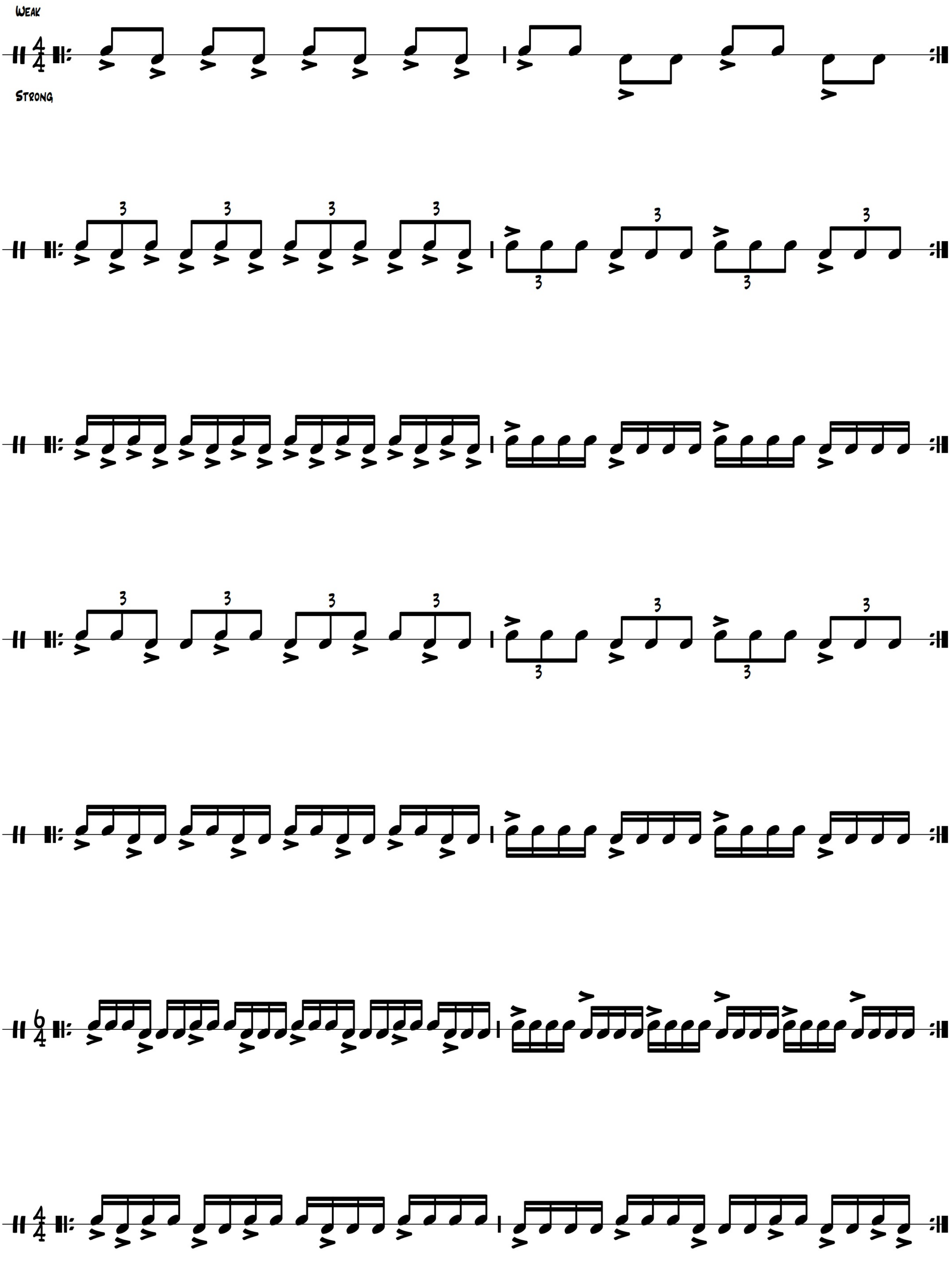
Finally, the goal will be to be able to play them all consecutively up and down the scale, in a single routine!

To accomplish this, I've borrowed an exercise from the "Great Hands For A Lifetime" DVD by drummer Tommy Igoe (by the way, the best rudimental routine I've ever seen, and I've seen many): this exercise is called "Truth Serum".

So, "Truth Serum" will be the last exercise at the bottom of the page (last 2 measures), and we will start with the single stroke combinations.

Ready? Let's go...

The Combinations



Chapter 3:

Multiple Levels - The Polyrhythms

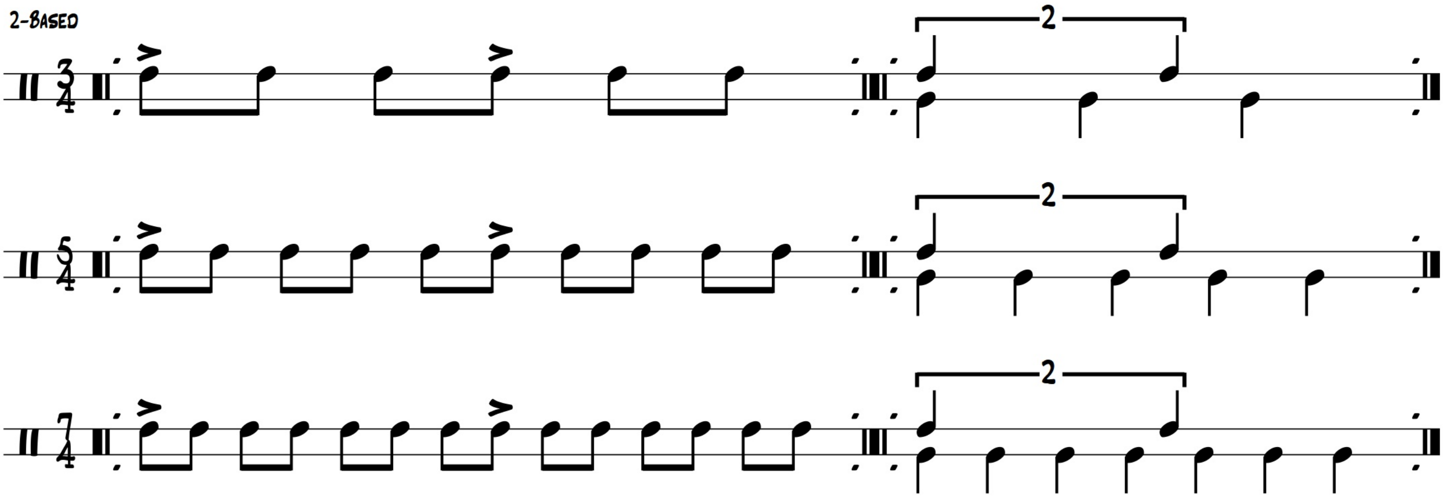
So far, we exercised playing the strokes on almost every available subdivision of the measure. Why do I say almost? Because we just used 2-based subdivisions for double strokes, 3-based subdivisions for triple strokes, and so on... With the exception of some of the exercises from chapter 2, everything has been even and plain. Now it's time to move things around a little bit. What if we used triple strokes over 4-based subdivisions? Or quadruple strokes over 5-based subdivisions? That's what polyrhythms are all about: playing a number of accents over another coprime number of beats. The word "coprime" (in refer to a couple of numbers) means that the highest integer they can both be divided by is 1: this also equals saying their greatest common divisor is 1. So, numbers 2 and 5 won't have an integer common submultiple other than 1, and the same will go for numbers 3 and 4, or 3 and 7, and so on...

How do polyrhythms work? Very simple: we start by defining the lowest rhythmic subdivision (it will act as a "grid") and then we will define the strokes to be played on it. Let's say we choose a duple subdivision like 8th notes (downbeat & upbeat) and we will play triple strokes on it. The result will be the first of the following exercises: there will be duplets accented every three notes, and the final result will be 2 against 3 as you can see in the second measure. Similarly, if we take triplets and we accent them every two notes (using double strokes) we will get 3 against 2. Of course, every one of this polyrhythms can be reversed: 2 against 3 can also be felt as 3 against 2, but we will get to this later...

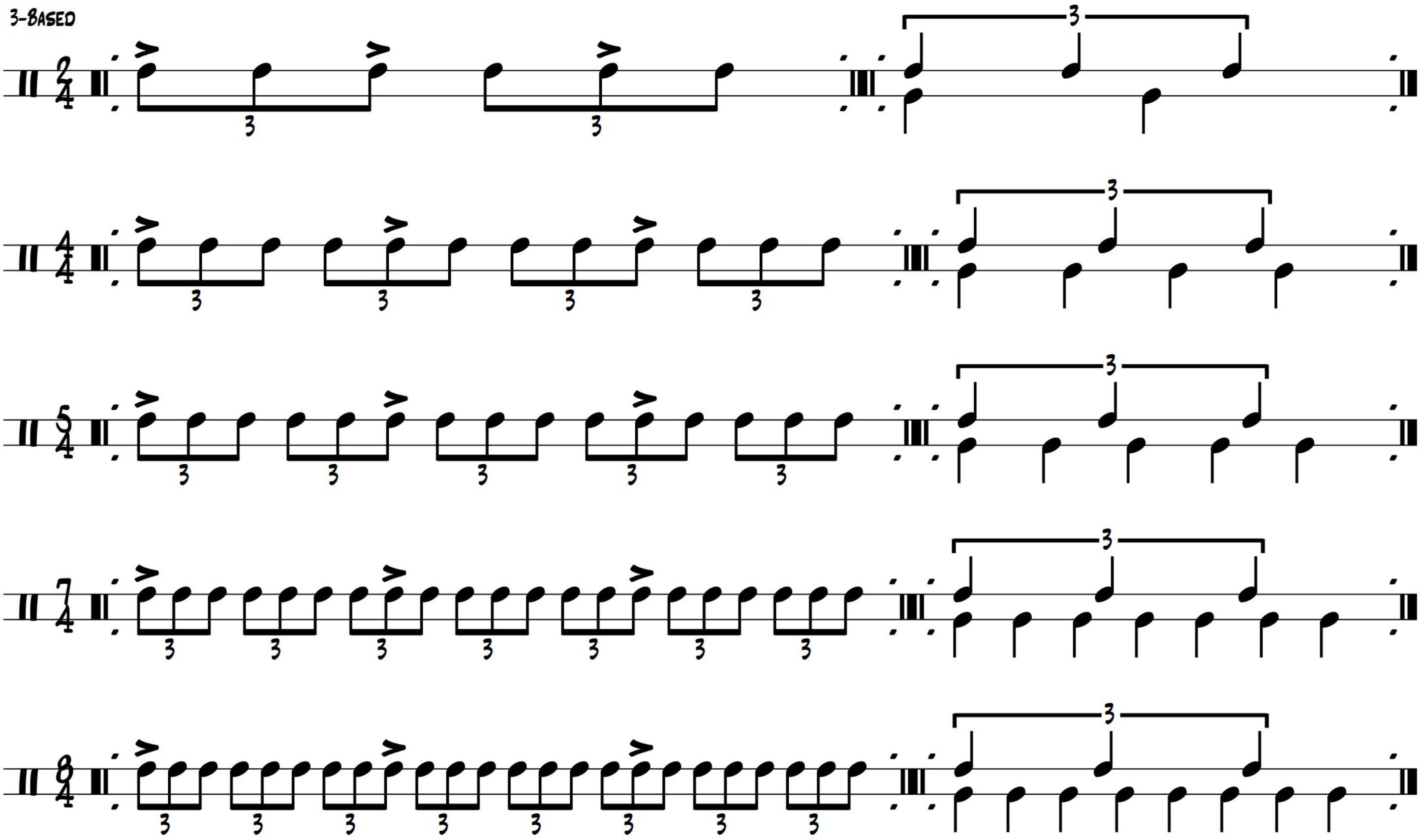
For now, make sure that you understand the mechanism: the number that defines subdivisions indicates the rhythm over the beat, and the number that defines the cycle of the accents (every how many notes you find an accent) indicates the beat. Think of the number of the cycle as something that goes over the beats until you come back to where you started: this concept will help you in future developments. Take a look at the following examples and make sure you understand the process.

The Polyrhythms

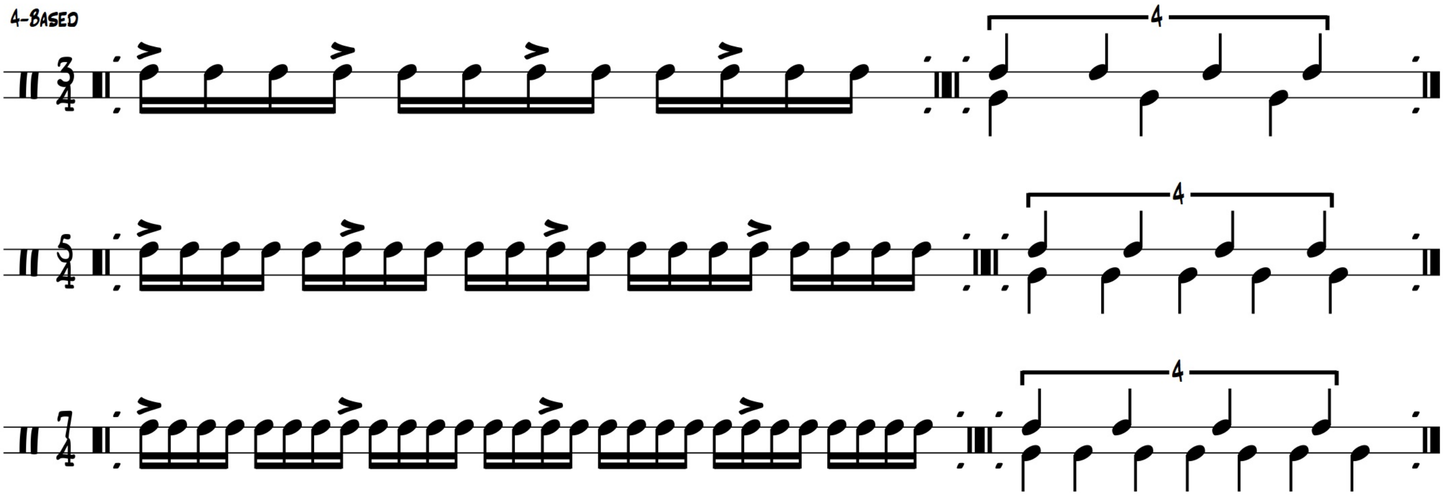
2-Based



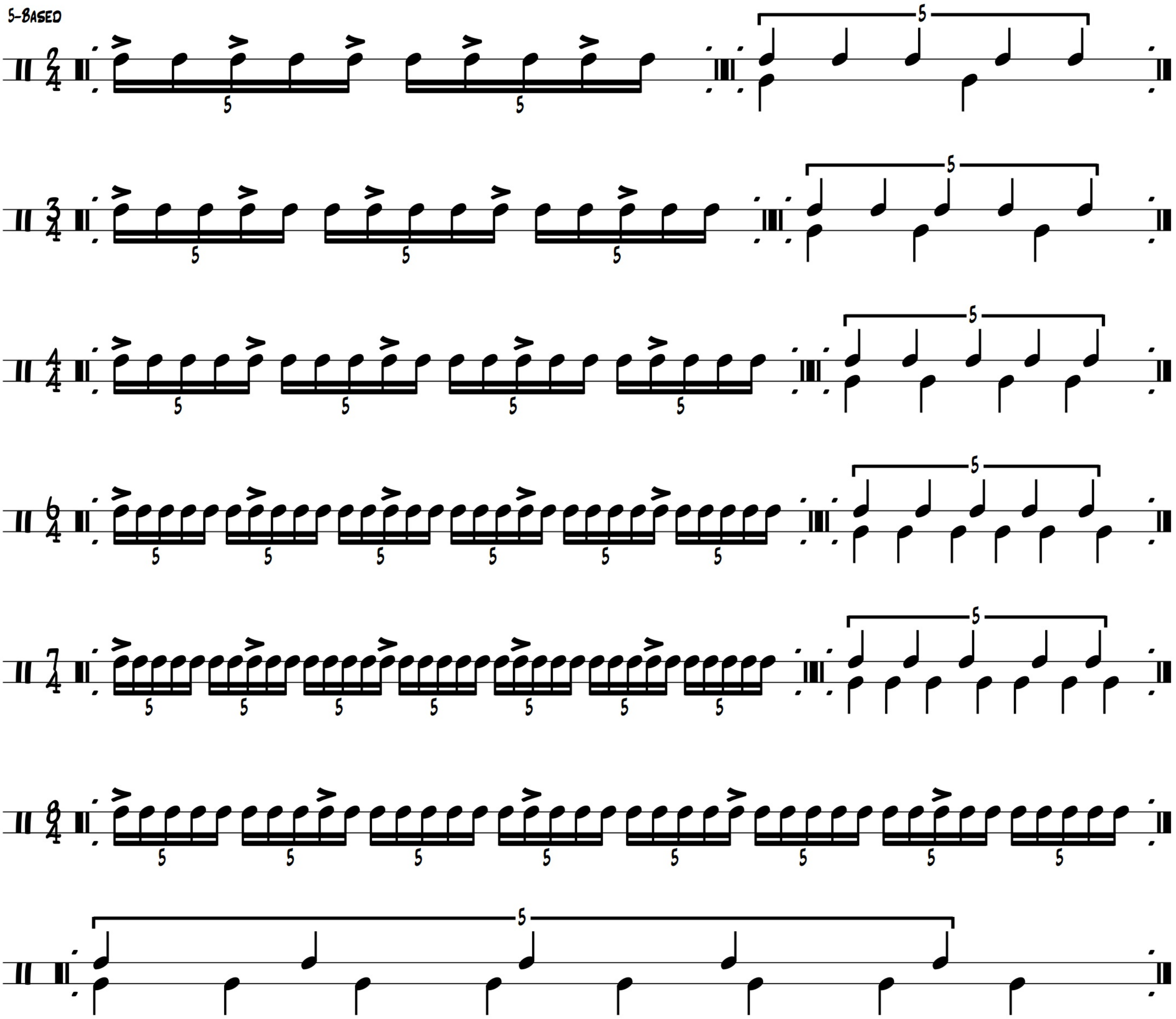
3-Based



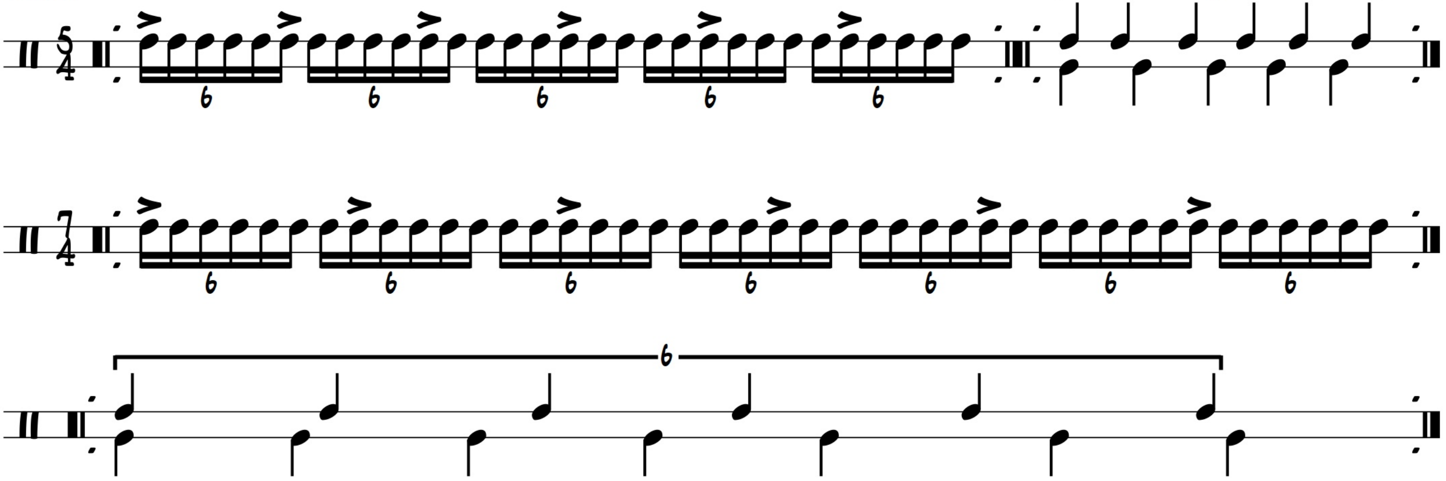
4-Based



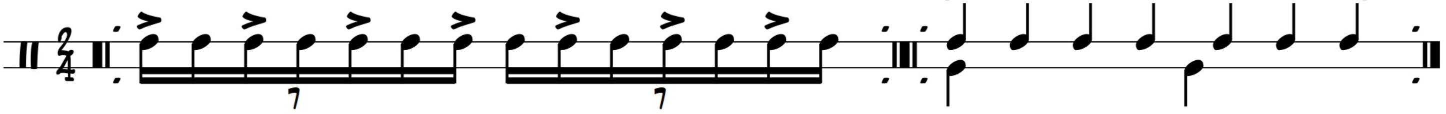
5-Based

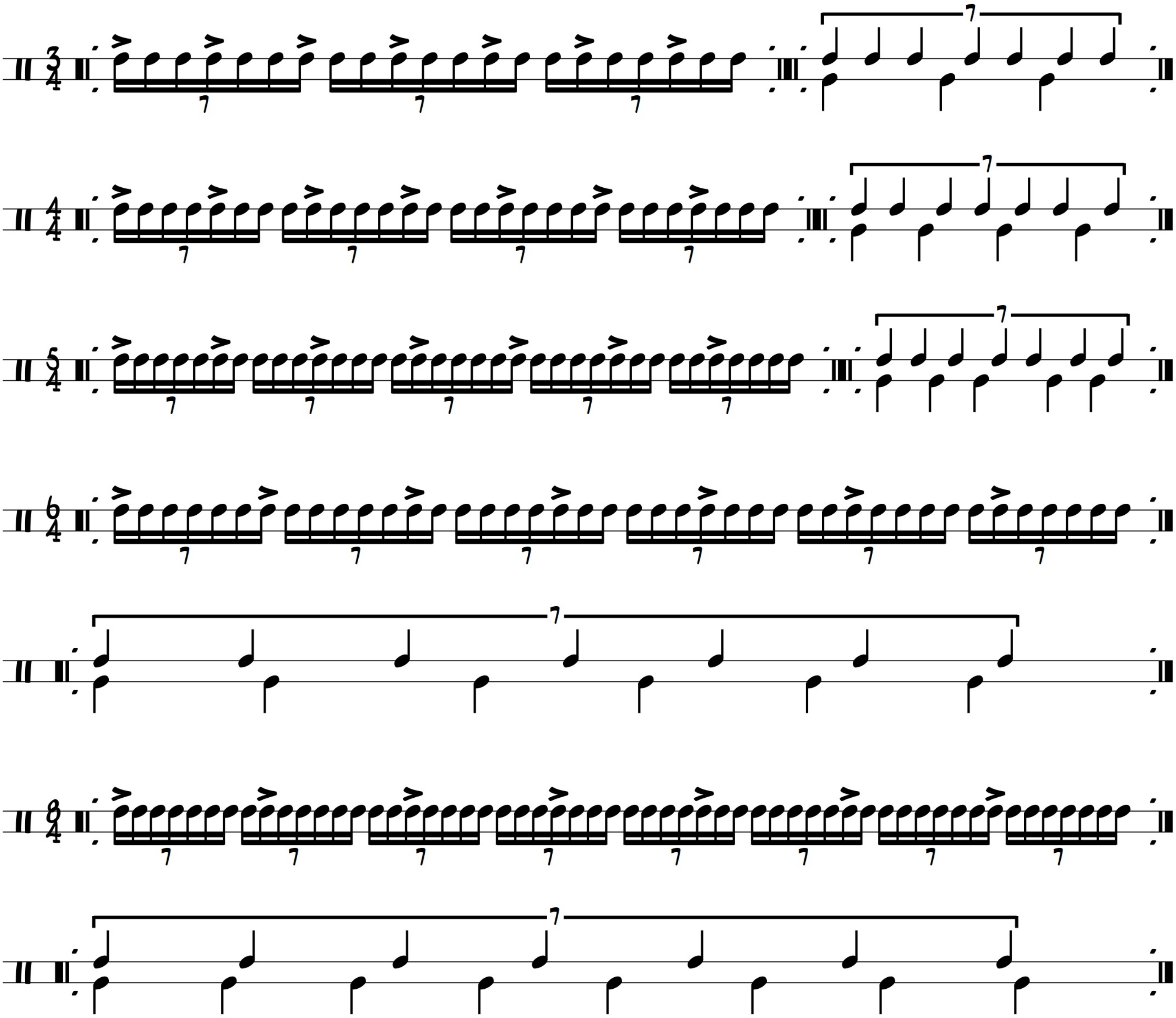


6-Based

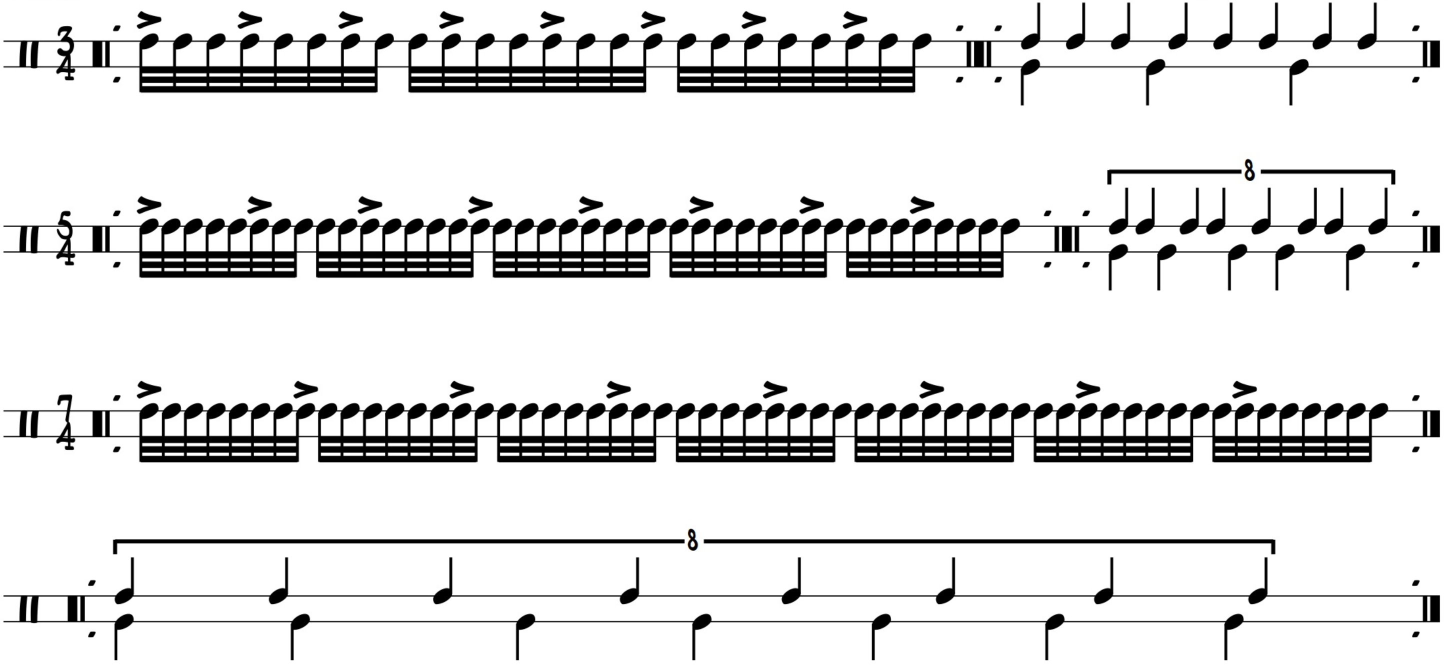


7-Based





8-Based



So, the rule goes as follow:

3 against 4 = triplets accented every four notes

4 against 5 = quadruplets accented every five

and so on...

You might have noticed that most of the times, more than four notes in a row are to be played: this is where the news sets in. While you might use just single to quadruple strokes to play groups from 1 to 4 notes, you might also want to mix the four basic strokes up to get the total amount of notes you need, which is necessary for the bigger groups anyway. For example: you may use 2 double strokes to play 4 notes, or 1 single + 1 triple to play the same amount. Of course, when 5 notes are to be played, you may use 1 double + 1 triple, or reverse (1 triple + 1 double), or 2 doubles and 1 single. This is totally up to you. I recommend you to check out the "Patterns" book series by Gary Chaffee as well as his DVDs for more insights about how to divide meters into stickings. However, for your reference, I have included the basic sticking possibilities for the exercises above. Remember that each one of this combinations can and should have its parts mixed to obtain all the possible permutations.

1. 1
2. 1/1, 2
3. 1/1/1, 1/2, 3
4. 1/1/1/1, 1/1/2, 2/2, 1/3, 4
5. 1/1/1/1/1, 1/1/1/2, 1/2/2, 1/1/3, 2/3, 1/4
6. 1/1/1/1/1/1, 1/1/1/1/2, 1/1/2/2, 2/2/2, 1/1/1/3, 1/2/3, 3/3, 1/1/4, 2/4
7. 1/1/1/1/1/1/1, 1/1/1/1/1/2, 1/1/1/2/2, 1/2/2/2, 1/1/1/1/3, 1/1/2/3, 2/2/3, 1/3/3, 1/1/1/4, 1/2/4, 3/4
8. 1/1/1/1/1/1/1/1, 1/1/1/1/1/1/2, 1/1/1/1/2/2, 1/1/2/2/2, 2/2/2/2, 1/1/1/1/1/3, 1/1/1/2/3, 1/2/2/3, 1/1/3/3, 2/3/3, 1/1/1/1/4, 1/1/2/4, 1/3/4, 4/4

Chapter 4:

Further Developments

This chapter is all about taking the material we've worked on so far and reusing it in some new and helpful ways. The good news is that we won't be doing any more difficult technical things here, we will just introduce some new concepts to apply to what we know already. Nevertheless, the methods described in this chapter, in spite of their simplicity, will take your playing to a whole new level.

Ready? Let's begin...

Application 1 - Mixed Limbs

So far, we have worked the hands and feet as couples, never mixing one hand with one foot, so the only thing left to do is to combine each hand with each foot. To do that, we will go through all of the routines from chapter 1 on, but this time we will proceed this way: we will start with the weak hand, and play the strong limb part with the weak foot, then reverse the limbs (starting with the weak foot followed by the weak hand, and so on...), just like we did for the hands!. Then, after playing the whole section (let's say, single strokes) this way, we will play it once more starting again with the weak hand, but this time playing the strong limb part with the strong foot, and then reversing the limbs. Then we will play the section once more starting with the strong hand, and playing the other part with the weak foot, reversing the limbs at the end. And finally, we will play the section one last time with the strong hand and the strong foot, and reverse.

For your reference, here's a quick summary of how things will work:

1) Weak Hand, Weak Foot (& reverse)
2) Weak Hand, Strong Foot (& reverse)
3) Strong Hand, Weak Foot (& reverse)
4) Strong Hand, Strong Foot (& reverse)

Remember to play the routines section by section and to always reverse the limbs: this is very important for complete development.

Application 2 - Rests

Up to now, we exercised using patterns that included notes played with one limb or another, but we didn't mention rests. Rests are fundamental tools in musical expression since they allow different motifs to come out, and they also allow for asymmetry of phrases, as we will see. For now, let's concentrate on making rests a part of our routine. The first thing to do is taking the material we've worked on so far and substitute rests for the limb that plays the downbeats (beats 1, 2, 3, 4 in 4/4 time), or playing rests instead of accents. Both methods will work differently and will give different result. Of course, any other creative solution is welcome. I encourage you to try your own different variations: what is important is that you take the material explored so far and you find new ways to incorporate rests in it. Good luck!

Application 3 - Patterns On Polyrhythms

So far, we treated polyrhythms in a very simple way: we just played series of consecutive notes, with different stickings; maybe we mixed some different stickings, but again we didn't consider rests.

Now it is time to introduce rests into our phrasing, and to do that we will proceed this way:

1. We will take groups of notes (in the polyrhythms) that begin with an accent and end just before the next accent: the number of notes contained in that group (including the first accent) we will call "cycle number". After all, since that group repeats evenly in the polyrhythm, it can be considered a cycle. Let's say we will take a cycle number of 4.
2. We will determine a total number of strokes to be played on that cycle, that we will call "stroke number". Let's say, 3.
3. Now, the only thing left is to determine where those strokes will be played, since distributing those 3 strokes over a 4-note cycle involves a variety of possibilities. One thing is sure: in every cycle, repeated ever after, there will be a rest. That's the meeting point between chapter 3 and application 2: rests in polyrhythms, which of course implies the formation of patterns.

Below are some examples of stroke distribution in the polyrhythm 3 over 4. The x indicates the stroke and the dot (.) the rest. The subdivision is 8th note triplets: do not mind the bars (|), they're there just for ease of reading!

1. x x . | x x x | . x x | x . x
2. x . x | x x . | x x x | . x x
3. x x x | . x x | x . x | x x .

Of course, you could generate each one of the patterns shown above by displacing one of them (shifting its start by one or more subdivisions, pretty much as we did for the the four basic strokes practice in chapter 1). What is important is that you understand how it works. Please note that in order for this method to work it is preferable to choose an uneven, asymmetrical distribution of the strokes in the cycle, otherwise you will find yourself very likely playing polyrhythms the basic way, and not patterns on polyrhythms.

So, to recap:

1. You take any cycle of notes that repeats evenly in the music.
2. You decide how many notes you want to play on that cycle.
3. You decide what notes you want to play, and distribute them in an asymmetrical manner.
4. You play them, honoring the rests.

Please do not underestimate the final step: talking about polyrhythms and the kind can make many of us speculate on the subject without even scratching the surface of playing. Take note that it takes time to develop a solid rhythmic foundation and the ability to feel the polyrhythms naturally. It will also take time to be able to feel the different layers of time while playing, and develop the ability to move from one to another. This is really what the next application will be all about.

Application 4 - Metric Modulation

One last application for us: this will be the most challenging and the most rewarding: metric modulation.

What does it mean?

Very simple: a metric modulation happens when we get into a time feel that can be felt at least in two different ways, first in one way, then we get into the other one, hence "metric modulation". Let's see how it works in reality.

Let's take for example the first polyrhythm 2 over 3, and play the top line of the first measure with the strong limb and the bottom line of the second measure with the weak, at the same time, keeping the metronome in quarter notes: in the beginning, you will feel the polyrhythm as it's written, but if you think of the top line subdivisions as triplets accented every three, with the 8th notes played at the same speed (8th=8th), you will begin to feel that the other parts (the metronome and the bottom line, that play exactly together) adjust accordingly, playing the figure shown at the top line of the second measure of polyrhythm 3 over 2, with the bottom line of that measure subdivided into 8th note triplets accented every three. In other words, the overall figure will reverse, becoming 3 over 2 instead of 2 over 3.

This will happen in the same way for all of the polyrhythms.

Let's take the second one, 2 over 5.

Play the top line of the first measure with the strong limb and the bottom line of the second measure with the weak, at the same time, keeping the metronome in quarter notes. So far so good, but if you think of the top line subdivisions (8th notes) as 16th quintuplets accented every five, played at the same speed (16th=8th), you will notice that the bottom line and the metronome (that play exactly together) will adjust accordingly, playing the figure shown at the top line of the second measure of polyrhythm 5 over 2, with the bottom line of that measure subdivided into 16th note quintuplets accented every five. So, again, the overall figure will reverse, becoming 5 over 2 instead of 2 over 5.

Now try some other modulations on your own: once you've understood the concept, it will be easier for you to pass from one "point of view" to another.

Of course, you can use patterns instead of plain polyrhythms, and I strongly encourage you to do that. Once you can feel the metric modulations in your body, as opposed to just think of them in your mind, you will be able to incorporate them into your playing, that will be much more founded, and will take great benefit from that, even just playing in standard time signatures. Actually, this exercises will take your internal rhythmic foundation to a whole new level!

For now, just practice and have fun!

Conclusions

We've come to the end of this short, intense companion in studies.

I would like to point out that, although many of the exercises shown here can be played with no effort just by using common sense and self-consciousness, nothing can replace a good instructor, especially one that has developed sensitivity, plays in a relaxed, effortless way and can be considered a good human being. After all, you're putting all your trust in an instructor, so it is necessary for him to be trustworthy. Please, do not underestimate this last. Nevertheless, I'm adding below just a short list of recommended buyings for your refer on drum techniques and concepts:

DVDs

- Jojo Mayer: "Secret Weapons For The Modern Drummer" series
- Steve Smith: "Drumset Technique / History Of The U.S. Beat", "Drum Legacy - Standing On The Shoulders Of Giants"
- Tommy Igoe: "Great Hands For A Lifetime"
- Gary Chaffee: "Phrasing And Motion", "Sticking Time, Linear Time, Rhythm And Meter"

Books

- Dom Famularo & Joe Bergamini: "It's Your Move", "Pedal Control"
- Gary Chaffee: "Patterns" series
- Ted Reed: "Syncopation"

Closing I would like to thank my family for always be supporting and allowing me to pursue my dream. I love you!

My best wishes for pursuing your drum journey, may it become a musical journey!

Blessings,

Gianpaolo

About the Author

Gianpaolo Gallian started drumming at the age of 9. He soon began studying Percussion Instruments at the Conservatory of Music in Rovigo (IT), which he attended for 8 years. After that, he switched to private drum studies, attending seminars and drum events. He came back to academical studies in 2009, graduating *cum laude* in Jazz Musical Disciplines (BD). As a drummer, he has played in many different musical situation, from *Top 40* to contemporary jazz-fusion to contemporary pop-rock, touring around Italy and Europe, while recording as a session player for some studios, and teaching privately. He currently teaches privately and studies for his Master's Degree in Jazz Musical Disciplines.

For more information, please visit the author's website at

http://gianpaologallian.blogspot.com